Case Report Rapport de cas

Gastric dilatation and volvulus in a 5-month-old Bernese mountain dog

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Abstract — A 5-month-old Bernese mountain dog was presented for unproductive vomitus and abdominal distension. A gastric dilatation and volvulus was diagnosed. The dog underwent gastric derotation and incisional gastropexy. No intra- or post-operative complications occurred. Eight months following surgery, the dog was in excellent physical condition with no recurrence of clinical episodes of gastric dilatation. To the authors' knowledge, gastric dilatation and volvulus has not been previously reported in a puppy. This report underlines the importance of considering a prophylactic gastropexy in juvenile dogs with a known breed predisposition for gastric dilatation and volvulus.

Résumé — Syndrome de dilatation torsion de l'estomac chez un Bouviers Bernois de 5 mois. Un Bouviers Bernois de 5 mois a été présenté pour des efforts de vomissements improductifs associés à une dilatation abdominale. Un syndrome de dilatation torsion de l'estomac a été diagnostiqué. Une dérotation gastrique et une gastropexie incisionnelle ont été réalisées. Aucune complication per- ou postopératoire n'est survenue. Huit mois après l'intervention chirurgicale, le chien présente un excellent état général sans récidive d'épisodes cliniques de dilatation gastrique. Il s'agit de la première description d'un syndrome de dilatation torsion de l'estomac chez un chiot. Ce cas souligne l'importance de considérer une gastropexie prophylactique précoce chez les chiens jeunes avec une prédisposition connue pour une dilatation torsion de l'estomac.

(Traduit par les auteurs)

Gastric dilatation and volvulus (GDV) is an acute and life-threatening disorder characterized by a progressively gas-distended stomach, which rotates along its longitudinal axis, subsequently leading to cardiovascular compromise. Despite immediate medical treatment and surgical intervention, mortality rates up to 33% have been reported (1–5). Gastric dilatation and volvulus syndrome occurs frequently in many large and giant breed dogs with the following breeds most commonly affected: Akita, bloodhound, Great Dane, Irish setter, Irish wolfhound, and standard poodle (2–4). Currently, GDV has only been described in adult dogs, with increasing age reported as being a risk factor (1–4,6,7).

This case report describes the clinical findings in a 5-month-old Bernese mountain dog, which was presented with GDV. To the authors' knowledge, GDV has not been previously reported in a puppy.

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Case description

A 5-month-old, 29-kg, intact male Bernese mountain dog was presented with a 2-hour history of unproductive vomitus and abdominal dilatation (Figure 1). The patient did not have any history of disease and had been regularly vaccinated.

On initial physical examination, the dog was bright, alert, and responsive. Body temperature was within normal limits. The dog showed tachypnea of 30 breaths/min, tachycardia of 120 beats/min, and congested mucous membranes with a capillary refill time > 2 s. Mild ptyalism was noted along with abdominal dilatation and tympany bilaterally behind the 13th rib. The remainder of the physical examination was unremarkable. A packed cell volume measurement revealed hemoconcentration [hematocrit 0.58 L/L; reference interval (RI): 0.37 to 0.55 L/L]. The serum chemistry profile revealed uremia (9.64 mmol/L; RI: 2.5 to 9.0 mmol/L), hyperphosphatemia (2.83 mmol/L; RI: 0.94 to 2.13 mmol/l), hypercalcemia (3.04 mmol/L; RI: 2.15 to 2.94 mmol/L), and elevated alanine aminotransferase (ALT; 653 U/L; RI: 10 to 118 U/L) and alkaline phosphatase (ALP; 223 U/L; RI: 20 to 150 U/L). A right-lateral abdominal radiograph revealed severe gastric dilatation and a typical "reverse C sign" consistent with GDV (Figure 2).

The dog was given a bolus of crystalloids (Chlorure de sodium 0.9%; B. Braun, Boulogne Billancourt, France), 20 mL/kg body weight (BW), IV, potentiated amoxicillin-clavulanic acid (Augmentin; GlaxoSmithKline, Marly-le-Roi, France),

Figure 1. Photograph of a 5-month-old Bernese mountain dog puppy presented with gastric dilatation and volvulus.

Figure 2. Right-lateral radiographic image of the abdomen of a 5-month-old Bernese mountain dog showing the typical "reverse C sign" consistent with gastric dilatation and volvulus (cranial is to the left of the image).

20 mg/kg BW, IV, q8h, morphine (Morphine; Lavoisier, Paris, France), 0.2 mg/kg BW, SQ, q4h, and ranitidine (Azantac; GlaxoSmithKline), 1 mg/kg, IV, q12h. The patient was premedicated with diazepam (Valium; Roche, Boulogne-Billancourt, France), 0.2 mg/kg BW, IV. Anesthesia was induced with propofol IV (PropoVet; Zoetis, Malakoff, France) as needed and maintained with an isoflurane/oxygen mixture. Intravenous crystalloids were continued at a rate of 10 mL/kg per hour.

Surgery was performed by a Board-certified surgeon (JGG). A standard ventral midline laparotomy was conducted and confirmed the radiographic findings of GDV with a gastric rotation of 270° (Figure 3A). The right and left short gastric vessels were torn causing a moderate hemoabdomen (Figure 3B). Blood (400 mL) was aspirated from the abdominal cavity. Derotation of the stomach was conducted followed by stomach decompression using an orogastric tube. After correction of the gastric malposition, the stomach and spleen were both evaluated. The gastric wall did not show any signs of devitalized tissues and there was no evidence of thrombosis or necrosis of the spleen. An incisional right-sided gastropexy was performed with 2 simple continuous patterns of 0 polyglyconate suture material (Monosyn; B. Braun, Tuttlingen, Germany). The abdominal cavity was lavaged with warm, isotonic saline (Chlorure de sodium 0.9%; B. Braun), and the abdominal incision was closed routinely. No intra-operative complications occurred. The electrocardiogram remained normal throughout the surgery and the immediate post-operative period.
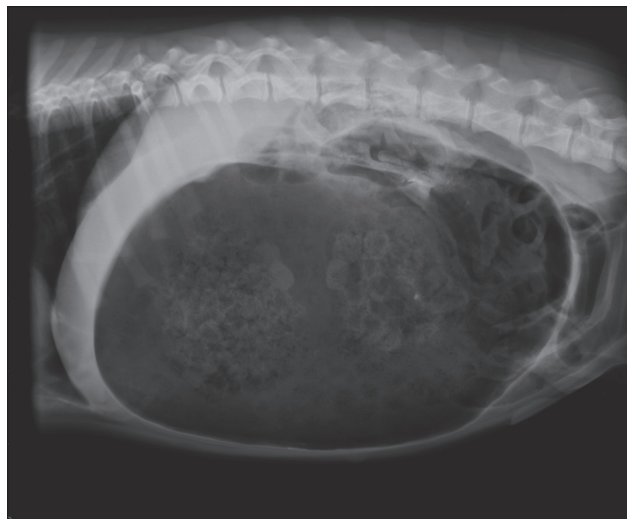
The dog made an uneventful recovery. Morphine was administered after surgery for 24 h (Morphine; Lavoisier), 0.2 mg/kg BW, SQ, q4h. Potentiated amoxicillin-clavulanic acid (Synulox; Zoetis), 20 mg/kg BW, PO, was administered twice daily. Blood pressure was recorded every 6 h and hematocrit and total protein were recorded 24 h after surgery. The hematocrit was 0.33 L/L (RI: 0.37 to 0.55 L/L) and total protein was 42 g/L (RI: 55 to 75 g/L).

The dog was discharged 3 d after surgery. Medication prescribed included potentiated amoxicillin-clavulanic acid (Synulox; Zoetis), 15 mg/kg BW, PO, q12h, for 5 d. Activity restriction was advised for 3 wk along with fractionated meals (3 times daily) of a hyper-digestible diet.

On recheck examination 2 wk after surgery by the referring veterinarian, the dog was bright, alert, and responsive with vital signs within normal limits. The skin incision was intact and appropriate, and skin sutures were removed. The owner reported normal appetite with no vomitus or regurgitation, normal water intake, and normal feces. At the last telephone follow-up 8 mo after surgery, the dog was in excellent physical condition with no recurrence of clinical signs or clinical episodes of gastric dilatation.

Discussion

In the case presented here, GDV was diagnosed in a 5-month-old Bernese mountain dog. To our knowledge, this is the first report of GDV in a puppy.

The etiology of GDV remains unclear and is influenced by several risk factors (1), with the following identified in retrospective epidemiological studies: being a large or giant purebred dog (1), increasing age (1,6), increasing thoracic depth-to-width ratio (1,3,8), having a relative with a history of GDV (3), and eating a diet containing small particles of food (6). Glickman et al (9) found in a study involving 202 dogs, that underweight dogs or dogs of thin body condition, eating 1 meal daily, eating rapidly, having a fearful temperament, or experiencing
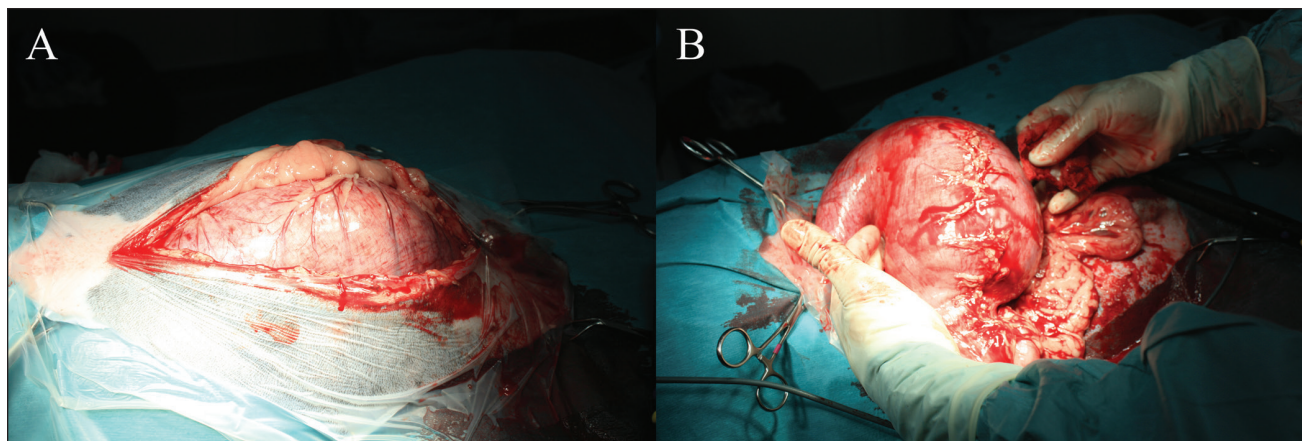
Figure 3. Intraoperative photographs. A – Stomach rotated 270° and covered by the omentum (cranial is to the left of the image). B – Stomach after derotation showing the torn short gastric vessels (cranial is to the left of the image).

a stressful event in the 8 h before the GDV episode, were at increased risk. Male gender was also found to be a risk factor in one study (9), whereas in another sexually intact females had the highest risk for GDV (10). Inflammatory bowel disease has also been implicated as a risk factor for GDV (11). Sartor et al (12) found increased odds of GDV in dogs with a history of previous splenectomy. Our dog did not have a history of chronic disease and had a normal body condition score at the time of surgery. His conformation was appropriate to age and breed standards.

Breeds at higher risk for GDV include the Great Dane, German shepherd, Irish setter, Weimaraner, Saint Bernard, and standard poodle (1–5). In studies from the United Kingdom and the United States, the Bernese mountain dog has not been found to be a high-risk breed for GDV. A recent study by Uhrikova et al (13) analyzed risk factors for GDV in central Europe and found the Bernese mountain dog to be the second most represented breed after the German shepherd (13). Therefore, the prevalence of GDV across breeds is likely to vary across countries according to frequencies of various breeds. In the treatment of clinical cases at their practice, the authors have also noticed that GDV was frequently observed in Bernese mountain dogs.

Gastric dilatation and volvulus has only been reported in adult dogs. Previous retrospective epidemiological studies identified increasing age as a risk factor for GDV (4,6,14) and age as the most important risk factor for GDV in Great Danes (7). In a retrospective study involving 151 dogs with GDV, median age at presentation was 9 y (range: 2 to 17 y) (12). In another study of 64 dogs, age ranged from 1.3 to 14.6 y (median: 8.2 y) (15). Schellenberg et al (3) reported that the odds ratio for development of GDV increased by 33% for each year of life.

In our case, an incisional gastropexy was performed. Various gastropexy techniques have been described with differing success rates and included: incisional, belt-loop, circumcostal, endoscopically assisted, laparoscopic gastropexy, gastrocolopexy, and incorporating gastropexy in which the gastric wall is included in the *linea alba* closure. Biomechanical testing for commonly performed open gastropexy techniques yielded similar results (16–20). However, cautious interpretation of quantitative biomechanical testing results is necessary as the absolute strength

of gastropexy for prevention of GDV is unknown. It is generally accepted that the incisional gastropexy is a strong, relatively quick, and easy technique to perform to prevent GDV.

The reported lifetime likelihood of developing GDV is 24% in large-breed show dogs and 21.6% in giant-breed show dogs. Lifetime risk of developing GDV syndrome is as high as 42% in Great Danes (4). Because GDV is associated with mortality rates up to 33% (1,2,9) and can be observed in puppies, it seems appropriate to consider a prophylactic gastropexy in juvenile dogs with a known breed predisposition for GDV (21).

Post-operative complications after prophylactic gastropexy have rarely been reported and include self-limiting gastrointestinal disease characterized by vomiting, regurgitation, diarrhea, and inappetence (22–25). Less frequently documented post-operative complications following elective gastropexy include suture site reaction or infection, seroma formation, aspiration pneumonia, and ventricular arrhythmias (21–24). In 1 case report, chronic intermittent vomiting was reported in a 20-month-old Great Dane after routine castration and prophylactic gastropexy performed *via* celiotomy at 6 mo of age. In that case, malpositioning of the pyloric antrum resulting in partial gastric outflow tract obstruction was suspected (26). It is possible that the dog's dramatic growth may have exacerbated the abnormal positioning of the gastric axis. To the authors' knowledge, no specific adverse effects have been reported in young dogs with correctly performed gastropexies (22,26).

Gastropexy can often be performed concurrently with sterilization in female dogs to avoid additional anesthetic episodes (22,27,28). Routine sterilization may be performed in dogs as early as 4 to 6 mo of age. However, no guidelines have been published with regard to minimum age or size requirements for performing prophylactic gastropexies in growing dogs. CVJ

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